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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/899,430

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Gert Lynge Nielsen

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EXAMINER

FLANAGAN, KRISTA M

ART UNIT

PAPER NUMBER

2631

DATE MAILED: 11/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/899,430

Applicant(s)

NIELSEN, GERT LYNGE

Examiner

Krista M. Flanagan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 is/are allowed.
- 6) ☒ Claim(s) 1, 3, 4, 6-9, 11 and 13-20 is/are rejected.
- 7) ☐ Claim(s) 2, 5, and 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 July 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 07/05/2001.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4-5) because
  - a. Reference character "220" has been used to designate both the 50 MHz phase lock loop and filter control in figure 7.
  - b. The following reference sign(s) are included in the drawing but not mentioned in the description: Figure 6, reference character 196a.
  - c. The following reference character(s) are included in the specification but not mentioned in the description: Figure 1, reference character 13, page 6, paragraph 0020, line 6.
2. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
3. In addition to Replacement Sheets containing the corrected drawing figure(s), applicant is required to submit a marked-up copy of each Replacement Sheet including annotations indicating the changes made to the previous version. The marked-up copy must be clearly

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labeled as "Annotated Marked-up Drawings" and must be presented in the amendment or remarks section that explains the change(s) to the drawings. See 37 CFR 1.121(d). Failure to timely submit the proposed drawing and marked-up copy will result in the abandonment of the application.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Saitoh et al, US Patent No. 4,491,976.

6. Referring to claim 1, Saitoh discloses a frequency converter for shifting the frequency of an input signal by a desired frequency comprising a first and second oscillator means for producing a first and second signal at a first and second frequency respectively (See column 1 lines 18-25); a frequency conversion means for converting the frequency of the input signal equal to the frequency difference of the first and second signal (See column 2, line 34, formula 3); a mixing means for mixing the first and second frequencies to produce a difference signal representative of the difference between the first and second frequencies (See column 12, lines 34-44); and a sampling means for sampling the frequency difference signal with a synthesized reference signal to produce a error signal corresponding to the difference between the difference signal and the desired frequency shift (See column 12, lines 47-53) where the first or second oscillator means is responsive to the error signal to adjust the frequency of the first and second signal respectively (See figure 14 and Column 12, lines 47-53).

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7. Referring to claim 18, Saitoh discloses a frequency conversion method, for shifting the frequency of an input signal by a desired frequency, comprising the steps of: generating a first signal at a first frequency; generating a second signal at a second frequency (See column 1 lines 18-25); mixing the input signal with the first signal to produce a shifted signal (See figure 14, blocks 1-6); mixing the shifted signal with the second signal to produce an output signal (See figure 14, blocks 6-9); mixing the first signal and the second signal to produce a difference signal (See column 12, lines 34-44 and figure 14, blocks 1-10, 64 and 65); comparing the difference signal with a pulse train signal, the pulse train signal having a harmonic corresponding to the desired frequency (see figure 14, blocks 69 and 71), producing, through aliasing, a low frequency error signal corresponding to the difference between the difference signal and the harmonic of the pulse train signal (See figure 14, blocks 69-71); and adjusting the frequency of one of the first signal and the second signal in response to the error signal (see figure 14, blocks 71 and 6).

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 3 and 4, are rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al, US Patent No. 4,491,976 in view of Hindman et al, US Patent No. 6,160,858.

10. Referring to claim 3, which inherits all of the limitations of claim 1, Saitoh does not expressly teach a sampling means comprising a pulse train generator to receive an external

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reference frequency signal that generates a synthesized external reference signal with reference to the external frequency symbol and having the same harmonic frequency. However, Hindman discloses a pulse train generator (See figure 2 and detailed description of same) that receives an external reference frequency signal and generates a synthesized external reference signal having the same harmonic frequency with reference to the external frequency symbol (See 6, lines 25-30). At the time this invention was made, it would have been obvious to a person of ordinary skill in the art to use a pulse train generator in the frequency converter to synthesize the external reference signal. One of ordinary skill in the art would have been motivated to do this for improved signal synchronization to achieve a controlled oscillator and avoid generation of harmonics.

11. Referring to claim 4, which inherits all of the limitations of claims 3, Saitoh does not expressly teach that the frequency converter comprises a pulse train generator that is comprised of a direct digital synthesis circuit, a comparator for clipping the output of the direct digital synthesis circuit and a comb generator for converting the edges of the output of the comparator to delta pulses. However, Hindman teaches a local oscillator comprising a direct digital synthesis circuit (See figure 2 and column 7, lines 7-10) that feeds into a comparator (See figure 2, block 110) for clipping the output of the direct digital synthesis circuit (figure 2, block 150) and a comb generator for converting the edges of the output of the comparator to delta pulses (See figure 2, blocks 120 and 140). At the time this invention was made, it would have been obvious to a person of ordinary skill in the art to use a direct digital synthesis circuit, a comparator for clipping the output of the direct digital synthesis circuit and a comb generator for converting the edges of the output of the comparator to delta pulses in the frequency converter

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generate smooth frequency waves as a pulse train generator. One of ordinary skill in the art would have been motivated to do this to avoid generation of harmonics.

12. Claims 6, 8, 9, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al, US Patent No. 4,491,976 in view of Stott et al, US Patent No. 6,320,915.

13. Referring to claim 6, which inherits all of the limitations of claim 1, Saitoh does not expressly disclose that the input signal may be a frequency shifted orthogonal frequency division multiplexed digital television signal. However, Stott teaches a synchronization that relates to OFDM signals such as may be used for broadcasting digital television signals (See column 1, lines 1-8). At the time this invention was made, it would have been obvious to a person of ordinary skill in the art to use OFDM signals such as may be used for broadcasting digital television signals. One of ordinary skill in the art would have been motivated to do this because of the error correction ability with OFDM.

14. Referring to claim 8, which inherits all of the limitations of claim 6, and referring to claim 20, which inherits all the limitations of claim 18, Saitoh discloses a frequency converter wherein the frequency converter is a down converter where the first oscillator shifts the frequency downwards and the second oscillator shifts the signal back upwards and outputs a signal having a frequency lower than the input signal for converting the input signal from a higher frequency to a lower immediate frequency (See column 1, lines 34-37 and figure 14).

15. Referring to claim 9, which inherits all of the limitations of claims 6, Saitoh does not expressly disclose that the input signal is a digital television signal. However, Stott teaches an OFDM signals such as may be used for broadcasting digital television signals in the ultra high frequency (uhf) bands (See figure 1, block 1 and column 1, lines 1-8). At the time this invention

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was made, it would have been obvious to a person of ordinary skill in the art to use OFDM signals such as may be used for broadcasting digital television signals. One of ordinary skill in the art would have been motivated to do this because of the error correction ability with OFDM and the good performance ability for multi-path propagation in the uhf spectrum for digital television signals.

16. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al, US Patent No. 4,491,976 in view of Stott et al, US Patent No. 6,320,915 as applied to claims 1 and 6 above, and further in view of Hindman et al, US Patent No. 6,160,858. Saitoh does not expressly teach that the frequency converter is an up converter for converting an input signal from an intermediate frequency to a higher frequency. However, Hindman teaches an RF subsystem that receives signals and converts them to an intermediate frequency (See column 2, lines 7-9) by mixing it with a local oscillator, which is then put through a system for processing from an intermediate frequency to a higher frequency. At the time this invention was made, it would have been obvious to a person of ordinary skill in the art to use an up converter for converting a signal from an intermediate to a higher frequency. One of ordinary skill in the art would have been motivated to do this to convert from an intermediate frequency to a receiving frequency and to increase resolution and frequency stability.

17. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al, US Patent No. 4,491,976 in view of Stott et al, US Patent No. 6,320,915 and in further view of Bjerede et al, US Patent No. 5,648,985. Saitoh discloses a pair of frequency synthesizers (local oscillators 1 and 2) for generating, based on an external frequency reference (See figure 14, block 70), signals having a frequency difference there between (See column 1 lines 18-25); a



converter for shifting the frequency of the IF signal by an amount corresponding to the frequency difference of the signals from the pair of frequency synthesizers (See column 2, line 34, formula 3); a reference signal generator for generating, based on the external reference signal, an internal reference signal having a harmonic at a frequency corresponding to the desired frequency (See figure 14, blocks 69-70); a sampler for sampling a frequency difference signal corresponding to the frequency difference of the signals from the pair of frequency synthesizers with the internal reference signal to produce an error signal corresponding to the difference between the frequency difference signal and the desired frequency (See column 12, lines 47-53); one of said frequency synthesizers being responsive to the error signal to adjust the frequency of the signal generated thereby to compensate for the difference between the frequency difference signal and the desired frequency (See figure 14 and column 12, lines 47-53). Saitoh fails to disclose a transmitter for transmitting orthogonal frequency division modulated (OFDM) signals, comprising: an OFDM transmission engine configured to accept a digital input signal and modulate the input signal onto a plurality of orthogonal carriers to produce a baseband OFDM signal; an intermediate frequency converter configured to accept the baseband OFDM signal as input and shift it to an intermediate frequency signal; and an RF frequency up converter for shifting the intermediate frequency (IF) signal by a desired frequency to an RF transmission frequency. However, Stott teaches an OFDM transmission engine which accepts a digital input (See column 1, lines 1-8). The OFDM signals are modulated onto several thousand individual carriers to produce a baseband OFDM signal. The input OFDM signal is then down converted and sampled for quantizing the signal into an appropriate signal (See column 3, lines 50-56) for processing to an intermediate frequency signal. Also, Bjerede teaches an RF frequency up converter for shifting the IF signal

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by a desired frequency to an RF transmission frequency (See column 1, lines 52-55). At the time this invention was made, it would have been obvious to a person of ordinary skill in the art to use OFDM transmission engine such as may be used for broadcasting digital television signals. It would have also been obvious to include an RF frequency up converter for transmission means. One of ordinary skill in the art would have been motivated to use OFDM signals such as may be used for broadcasting digital television signals because of the error correction ability with OFDM and to include an RF frequency converter for transmitter applications.

18. Referring to claim 16, which inherits all the limitations of claim 15, Saitoh discloses a transmitter wherein a sampler comprises a mixer for generating an error signal from aliasing the results from mixing the frequency difference signal and the internal reference signal. (See figure 14, blocks 65-70 and column 12, lines 35-53).

19. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al, US Patent No. 4,491,976 in view of Stott et al, US Patent No. 6,320,915 as applied to claims 15 and 16 above, and further in view of Hindman et al, US Patent No. 6,160,858. Claim 17 inherits all of the limitations of claim 16. Saitoh and Stott do not expressly teach that the frequency converter comprises a pulse train generator that is comprised of a direct digital synthesis circuit, a comparator for clipping the output of the direct digital synthesis circuit and a comb generator for converting the edges of the output of the comparator to delta pulses. However, Hindman teaches a local oscillator comprising a direct digital synthesis circuit (See figure 2 and column 7, lines 7-10) that feeds into a comparator (See figure 2, block 110) for clipping the output of the direct digital synthesis circuit (figure 2, block 150) and a comb generator for converting the

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edges of the output of the comparator to delta pulses (See figure 2, blocks 120 and 140). At the time this invention was made, it would have been obvious to a person of ordinary skill in the art to use a direct digital synthesis circuit, a comparator for clipping the output of the direct digital synthesis circuit and a comb generator for converting the edges of the output of the comparator to delta pulses in the frequency converter generate smooth frequency waves as a pulse train generator. One of ordinary skill in the art would have been motivated to do this to avoid generation of harmonics.

20. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al, US Patent No. 4,491,976 as applied to claim 18 above in view of Hindman et al, US Patent No. 6,160,858. Saitoh does not expressly teach that the frequency converter is an up converter for converting an input signal from an intermediate frequency to a higher frequency. However, Hindman teaches an RF subsystem that receives signals and converts them to an intermediate frequency (See column 2, lines 7-9) by mixing it with a local oscillator, which is then put through a system for processing from an intermediate frequency to a higher frequency. At the time this invention was made, it would have been obvious to a person of ordinary skill in the art to use an up converter for converting a signal from an intermediate to a higher frequency. One of ordinary skill in the art would have been motivated to do this to convert from an intermediate frequency to a receiving frequency and to increase resolution and frequency stability.

***Allowable Subject Matter***

17. Claims 2, 5 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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18. Claim 10 is allowable over prior art. Prior art fails to teach a frequency converter for shifting the frequency of an input signal by a desired frequency, and that receives an external reference frequency signal, the frequency converter comprising: **a first oscillator that receives the external reference frequency signal and that produces a first signal at a first frequency; a second oscillator, responsive to a error signal, that receives the external reference frequency signal and that produces a second signal at a second frequency**, the input signal being shifted in frequency by the difference between the first frequency and the second frequency; in combination with: a difference circuit, comprising a difference mixer and a difference low pass filter, the difference mixer receiving the first signal and the second signal and producing a mixed signal, and the difference low pass filter filtering the mixed signal to produce a difference signal; a pulse train generator that receives the external reference frequency signal and that generates a pulse train signal with a harmonic at the desired frequency', and a sampler circuit for receiving the pulse train signal and the difference signal to produce the error signal.

### ***Conclusion***

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. US Patent No. 5,574,998 to Andoh discloses an automatic frequency control circuit.
- b. US Patent No. 6,052,419 to Hioki discloses a frequency adjusting method.
- c. US Patent No. 4,726,072 to Yamashita a double converter tuner.

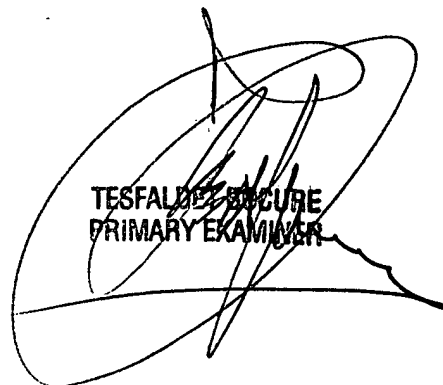
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krista M. Flanagan whose telephone number is (571) 272-2203. The examiner can normally be reached on Monday - Friday, 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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PRIMARY EXAMINER